WHAT IS CLAIMED IS:

1. A laser apparatus comprising:

an optical system for sampling a part of a laser beam emitted from an oscillator;

a means for generating an electric signal that contains an energy fluctuation of the laser beam as a data using the part of the laser beam sampled;

a light amount adjusting means for adjusting an energy of the laser beam emitted from the oscillator by changing a transmittance thereof; and

a signal processing unit for subjecting the electric signal to a signal processing to calculate a frequency, an amplitude, and a phase of the energy fluctuation of the laser beam, the signal processing unit controlling the transmittance such that a phase of the transmittance change in antiphase to the phase of the energy fluctuation of the laser beam and with an amplitude of the transmittance capable of reducing the amplitude of the energy fluctuation of the laser beam emitted from the oscillator, the control being made based on a phase difference between a phase of a signal that is in synchronization with an oscillation of the laser beam emitted from the oscillator and the phase calculated, on the energy ratio of the sampled laser beam to the laser beam emitted from the oscillator, and on the frequency and the amplitude calculated.

2. A laser apparatus comprising:

a light amount adjusting means for adjusting an energy of an incident laser beam by changing a transmittance thereof;

a driver for controlling the transmittance of the light amount adjusting means;

an entrance side optical system for sampling a part of the laser beam that enters the light amount adjusting means;

a means for generating a first electric signal that contains as a data an energy fluctuation of the laser beam that enters the light amount adjusting means using the part of the laser beam sampled by the entrance side optical system;

an exit side optical system for sampling a part of a laser beam of which the energy has been adjusted by the light amount adjusting means;

a means for generating a second electric signal that contains as a data an energy fluctuation of the laser beam of which the energy has been adjusted by the light amount adjusting means using the part of the laser beam sampled by the exit side optical system; and

a signal processing unit for subjecting the first electric signal and the second electric signal to a signal processing to grasp a state of the energy fluctuation of the laser beam that enters the light amount adjusting means as well as a state of the energy fluctuation of the laser beam whose energy has been adjusted by the light amount adjusting means, the signal processing unit controlling the driver such that a phase of the transmittance changes in antiphase to the phase of energy fluctuation of the laser beam that

enters the light amount adjusting means.

3. A laser apparatus comprising:

an optical system for sampling a part of a laser beam emitted from an oscillator;

a voltage controlling means for controlling a voltage to be applied to an electric discharge tube of the oscillator;

a means for generating an electric signal that contains as a data an energy fluctuation of the laser beam using the part of the laser beam sampled by the optical system; and

a signal processing unit for subjecting the electric signal to a signal processing to grasp a state of the energy fluctuation of the laser beam, the signal processing unit controlling the voltage controlling means such that a phase of the voltage to be applied to the electric discharge tube changes in antiphase to the phase of the energy fluctuation of the laser beam.

4. A laser apparatus comprising:

an optical system for sampling a part of a laser beam emitted from an oscillator;

a voltage controlling means for controlling a voltage to be applied to an electric discharge tube of the oscillator;

a means for generating an electric signal that contains as a data an energy fluctuation of the laser beam from the part of the laser beam sampled by the optical system; and

a signal processing unit for subjecting the electric signal to a signal processing to calculate a frequency, an amplitude, and a phase of the energy fluctuation of the laser beam, the signal processing unit controlling the voltage controlling means such that a phase of the voltage to be applied to the electric discharge tube changes in antiphase to the phase of the energy fluctuation of the laser beam and with an amplitude of the voltage capable of reducing the amplitude of the energy fluctuation of the laser beam emitted from the oscillator, the control being made based on a phase difference between a phase of the signal that is in synchronization with an oscillation of the laser beam emitted from the oscillator and the phase calculated, on an energy ratio of the sampled laser beam to the laser beam emitted from the oscillator, and on the frequency and the amplitude calculated.

5. A laser irradiation method, comprising:

sampling a part of a laser beam emitted from an oscillator;

generating an electric signal that contains as a data an energy fluctuation of the laser beam using the part of the laser beam sampled;

subjecting the electric signal to a signal processing to calculate a frequency, an amplitude, and a phase of the energy fluctuation of the laser beam and, based on the phase difference between a phase of a signal that is in synchronization with an oscillation of the

laser beam emitted from the oscillator and the phase calculated, on an energy ratio of the sampled laser beam to the laser beam emitted from the oscillator, and on the frequency and the amplitude calculated; and

controlling a transmittance of a light amount adjusting means such that a phase of the transmittance changes in antiphase to the phase of the energy fluctuation of the laser beam and with an amplitude of the transmittance capable of reducing the amplitude of the energy fluctuation of the laser beam emitted from the oscillator.

6. A laser irradiation method, comprising:

sampling a part of a laser beam that enters a light amount adjusting means to generate a first electric signal that contains as a data an energy fluctuation of the laser beam that enters the light amount adjusting means;

sampling a part of a laser beam whose energy has been adjusted by the light amount adjusting means to generate a second electric signal that contains as a data an energy fluctuation of the laser beam whose energy has been adjusted by the light amount adjusting means;

subjecting the first electric signal and the second electric signal to signal processing to grasp a state of the energy fluctuation of the laser beam that enters the light amount adjusting means as well as a state of the energy fluctuation of the laser beam whose energy has been adjusted by the light amount adjusting means; and

controlling the transmittance of the light amount adjusting means such that a phase of the transmittance changes in antiphase to the phase of the energy fluctuation of the incident laser beam and with an amplitude of the transmittance capable of reducing the amplitude of the energy fluctuation of the incident laser beam.

7. A laser irradiation method, comprising:

sampling a part of a laser beam emitted from an oscillator;

generating an electric signal that contains as a data an energy fluctuation of the laser beam using the part of the laser beam;

subjecting the electric signal to a signal processing to grasp a state of the energy fluctuation of the laser beam; and

controlling a voltage to be applied to an electric discharge tube of the oscillator such that a phase of the voltage changes in antiphase to the phase of the energy fluctuation of the laser beam.

8. A laser irradiation method, comprising:

sampling a part of a laser beam emitted from an oscillator;

generating an electric signal that contains as a data an energy fluctuation of the laser beam using the part of the laser beam sampled;

subjecting the electric signal to a signal processing to calculate a frequency, an

amplitude, and a phase of the energy fluctuation of the laser beam; and

controlling a voltage to be applied to an electric discharge tube of the oscillator such that a phase of the voltage changes in antiphase to the phase of the energy fluctuation of the laser beam and with an amplitude of the voltage capable of reducing the amplitude of the energy fluctuation of the laser beam emitted from the oscillator, based on a phase difference between a phase of the signal that is in synchronization with an oscillation of the laser beam emitted from the oscillator and the phase calculated, on an energy ratio of the sampled laser beam to the laser beam emitted from the oscillator, and on the frequency and amplitude calculated.

9. A laser irradiation method comprising controlling a transmittance of a light amount adjusting means such that a phase of the transmittance changes in antiphase to a phase of an energy fluctuation of the laser beam and with an amplitude of the transmittance capable of reducing an amplitude of the energy fluctuation of the laser beam emitted from the oscillator.

10. A laser irradiation method comprising controlling a voltage to be applied to an electric discharge tube of an oscillator such that a phase of the voltage changes in antiphase to a phase of an energy fluctuation of a laser beam and with an amplitude of the voltage capable of reducing an amplitude of the energy fluctuation of the laser beam emitted from the oscillator.

11. A method of manufacturing a semiconductor device, comprising:

sampling a part of a laser beam emitted from an oscillator;

generating an electric signal that contains as a data an energy fluctuation of the laser beam from the part of the laser beam sampled;

subjecting the electric signal to a signal processing to calculate a frequency, an amplitude, and a phase of the energy fluctuation of the laser beam;

controlling the transmittance of a light amount adjusting means such that a phase of the transmittance changes in antiphase to the phase of the energy fluctuation of the laser beam and with an amplitude of the energy fluctuation capable of reducing the amplitude of the energy fluctuation of the laser beam emitted from the oscillator, based on a phase difference between a phase of a signal that is in synchronization with an oscillation of the laser beam emitted from the oscillator and the phase calculated, on an energy ratio of the sampled laser beam to the laser beam emitted from the oscillator, and on the frequency and amplitude calculated; and

enhancing crystallinity of a semiconductor film by irradiating the semiconductor film with the laser beam after the controlling step.

12. A method of manufacturing a semiconductor device, comprising:

sampling a part of a laser beam that enters a light amount adjusting means to generate a first electric signal that contains as a data an energy fluctuation of the laser beam that enters the light amount adjusting means;

sampling a part of a laser beam whose energy has been adjusted by the light amount adjusting means to generate a second electric signal that contains as a data an energy fluctuation of the laser beam whose energy has been adjusted by the light amount adjusting means;

subjecting the first electric signal and the second electric signal to a signal processing to grasp a state of the energy fluctuation of the laser beam that enters the light amount adjusting means as well as a state of the energy fluctuation of the laser beam whose energy has been adjusted by the light amount adjusting means;

controlling the transmittance of the light amount adjusting means such that a phase of the transmittance changes in antiphase to the phase of the energy fluctuation of the incident laser beam and with an amplitude of the transmittance capable of reducing the amplitude of the incident laser beam; and

enhancing crystallinity of a semiconductor film by irradiating the semiconductor film with the laser beam after the controlling step.

13. A method of manufacturing a semiconductor device, comprising:

sampling a part of a laser beam emitted from an oscillator;

generating, from the part of the laser beam, an electric signal that contains as a data an energy fluctuation of the laser beam;

subjecting the electric signal to a signal processing to grasp a state of the energy fluctuation of the laser beam;

controlling a voltage to be applied to an electric discharge tube of the oscillator such that a phase of the voltage changes in antiphase to the phase of the energy fluctuation of the laser beam; and

enhancing crystallinity of a semiconductor film by irradiating the semiconductor film with the laser beam after the controlling step.

14. A method of manufacturing a semiconductor device, comprising:

sampling a part of a laser beam emitted from an oscillator;

generating an electric signal that contains as a data an energy fluctuation of the laser beam using the part of the laser beam;

subjecting the electric signal to a signal processing to calculate a frequency, an amplitude, and a phase of the energy fluctuation of the laser beam;

controlling a voltage to be applied to an electric discharge tube of the oscillator such that a phase of the voltage changes in antiphase to the phase of the energy fluctuation of the laser beam and with an amplitude of the voltage capable of reducing the amplitude of the energy fluctuation of the laser beam emitted from the oscillator, based on a phase

difference between the phase of a signal that is in synchronization with an oscillation of the laser beam emitted from the oscillator and the phase calculated, on an energy ratio of the sampled laser beam to the laser beam emitted from the oscillator, and on the frequency and amplitude calculated; and

enhancing crystallinity of a semiconductor film by irradiating the semiconductor film with the laser beam after the controlling step.

15. A method of manufacturing a semiconductor device comprising:

controlling a transmittance of a light amount adjusting means such that a phase of the transmittance changes in antiphase to a phase of an energy fluctuation of the laser beam and with an amplitude of the transmittance capable of reducing an amplitude of the energy fluctuation of the laser beam emitted from the oscillator; and

irradiating a semiconductor film with the laser beam after the controlling step.

16. A method of manufacturing a semiconductor device comprising:

controlling a voltage to be applied to an electric discharge tube of an oscillator such that a phase of the voltage changes in antiphase to a phase of an energy fluctuation of a laser beam and with an amplitude of the voltage capable of reducing an amplitude of the energy fluctuation of the laser beam emitted from the oscillator; and

irradiating a semiconductor film with the laser beam after the controlling step.